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Reducing Central Line Associated Blood Stream Infections through Staff Education and Best Practice Guidelines

Iselande Desyr

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University of Massachusetts, Amherst

College of Nursing

Chair: Pamela Aselton, PhD, MPH, FNP-BC

Mentor: Olga Brown-Vanderpool, MPH, MA, BSN. RN

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Abstract

Background: Healthcare associated infections result in patient mortality and increase healthcare costs worldwide. These infections often lead to blood stream infections secondary to site contamination and human errors. Many of these infections could be avoided if proper aseptic techniques were used at all times by all staff.

Methods: This quality improvement project focused on reducing Central Line Associated Blood Stream Infections through staff education and current best-practice guidelines. The Institute for Healthcare Instrument recommends five key measures which were implemented at a sub-acute Health Care Center facility in Connecticut. Mandatory in-services for nursing staff were held with pre and post-tests to assess learning, record review to assess documentation of preventative measures and the overall trend for central line infections and length of stay were monitored.

Results: The 22 nurses who participated in the pre and post-tests surveys scored from 67% to 88%. The central line maintenance practices improved up to 40 % (30 % to 70 %.) and CLABSI prevention strategies provided a 54% (23% to 77%) improvement from pre to post intervention. There was a significant reduction of CLABSI's of 78.3% from September 2019 to an average rate of 90% approximately three months post intervention.

Discussion: The survey results helped develop subsequent plan for educational interventions regarding appropriate central line practices and CLABSI prevention strategies. Changes resulted in large and sustained reduction in rates of infections that were maintained throughout an 18 month during project.

Keywords: alcohol based, hand hygiene compliance, healthcare-associated infections, central-line, blood stream infection, infection control practices, health care provider knowledge, performance improvement.

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Introduction

Healthcare acquired infection (HAI) is ranked as one of the top five causes of death in the United States (Gaynes & Bans, 2016). In the United States, approximately 1.7 million individuals contract HAIs annually, resulting in almost 100,000 deaths (Jacobs, 2014). According to Hota, Malpiedi, Fridkin, Martin and Trick (2016), at least, 20% of all HAIs can be prevented. The Institute of Medicine (IOM) brought to light the safety risks hospitalized patients face on a daily basis. The numbers are staggering and allowed for an opportunity to change the culture of safety in the nation healthcare system. The IOM has proposed and implemented new strategies to combat the risks associated with HAIs and improve how healthcare providers can deliver safe care.

According to the Center for Disease Control and Prevention (CDC), thousands of people die annually from CLABSI-related issues. In addition, CLABSI leads to increased healthcare expenses estimated to be in the billions. This agency is working with other healthcare agencies to increase awareness and the importance of preventing infections by establishing HAI-prevention programs (CDC, 2017). The change needed to reduce healthcare associated infections is in the area of knowledge, skills, practice and policy.

The goal of this DNP project is to assess the gaps between staff's knowledge and infection control practices, as it impacts the rate of CLABSI and patient outcomes (See Appendix A). According to Edwards, Purpura, and Kochvar (2014) there are solutions available to address the need to bridge the gap and to overcome the barriers with the implementation of best practice guidelines and staff education.

Background

In 1999 the Institute of Medicine (IOM) brought to light the safety risks hospitalized patients face on a daily basis. The numbers seem staggering, but they have allowed for an open discussion which has provided opportunities to learn and to change the culture of safety in our healthcare system. According to the Agency for Healthcare Research and Quality [AHRQ] (2015), HAIs are the most common complication of hospital and sub-acute care facilities. In fact they are the most common complications of health care organizations and the top ten leading causes of death in the United States (CDC, 2017). These infections account for an estimated 1.7 million infections and 99,000 associated deaths in 2002 (AHRQ, 2015). However, recent studies suggest that implementing existing prevention practices can lead up to a 70 percent reduction in many HAIs such as Methicillin-Resistant Staphylococcus Aurea (MRSA), Clostridium difficile (C-diff), Catheter-Associated Urinary Tract Infections (CAUTI), CLABSI and other nosocomial conditions (Knudson, 2014).

In August 2010, the Centers for Medicare and Medicaid Services (CMS) (2013) released the inpatient prospective payment plan regulations including rules prohibiting reimbursement for healthcare acquired conditions. In October 2012, the CMS announced hospitals would no longer receive additional payment for any hospital acquired surgical site infection, pressure ulcers stage III and IV, CAUTI, air embolism, blood incompatibility, falls or trauma, vascular catheter associated infection or retained surgical objects in an attempt to increase hospitals' accountability.

In 2015, sub-acute care, rehabilitation centers and long-term care facilities would also no longer be reimbursed and would be penalized as well for HAIs (CDC, 2017). Facilities with patients discharged with a Current Procedural Terminology (CPT) diagnosis code that designates

a nosocomial condition that was not identified upon admission will not be reimbursed (CDC, 2017). This change was in response to concerns expressed by the public and policy makers aimed at reducing HAIs illustrated via a Gantt chart or an action plan (Flodgren, Conterno, Mayhew, Omar, Pereira, & Shepperd, 2015).

A Gantt chart is a visual tool used to guide the improvement work by illustrating the activity schedule. Specific tasks are planned, coordinated, and tracked in order. An estimation of the time and resources needed for the improvement process is shown. An action plan with specific tasks is developed to correlate with the Gantt chart (Nelson, Batalden, & Godfrey, 2007). (See appendix B). Whereas the action plan is a list of tasks specific to the next steps that need to be completed to achieve the stated improvement of goals and is a simple, helpful organizing tool to keep improvement activities on track over time (Nelson, Batalden & Godfrey, 2007. p. 364). (See appendix C).

After reviewing the *AACN Roadmap for Implementing Change*, the action plan created for the specific aim is:

Build interdisciplinary team to assist with process change

Create competency: Pre and Post Tests

Staff education: Flyers regarding CHG education to be placed in each unit

Implement daily chlorhexedine gluconate on unit

Present EBP guidelines to team and rationale for implementation

Problem Statement

Central line associated infection occurrence has many causes and must be treated with a multimodal approach. The problem identified in the unit is the increased incidence of HAIs specifically, CLABSI. Many states and territories require hospitals to share their occurrence of

HAIs to health departments. The State of Connecticut mandates HAIs reporting which has a direct impact on reimbursement (CDC, 2017). Blood stream infections have been the focus of many quality improvement initiatives and are among the leading causes of nosocomial sepsis that causes morbidity and mortality (Flodgren et al., 2015). The interventions are surprisingly basic; handwashing sits at the top of the list. The CDC (2017) reiterates the important role of proper HH and aseptic technique when managing CL.

Organizational "Gap" Analysis of Project Site

The quality improvement project took place at a subacute facility in Middletown, Connecticut. The most recent HCAPS survey scores at the facility released in December 2017 indicated opportunities for improvement in the reduction of CLABSI. The results also showed a reduction in acquired pressure ulcers and improvement in the cleanliness of the rooms. The overall unit score was above the 90th percentile, indicating the unit's effort to improve performance; however, there are still gaps in the system.

As part of the project policy/practice gaps on infection were identified based on intermittent reports and questions from nursing staff. All elements of CLABSI prevention are considered and prevention strategy questions were based on practices observed through clinical rounding. The idea was to raise safety practices, increase awareness, and keep it as priority to positively impact the unit's overall performance creating a culture of safety.

There are many factors that have been linked to the increased rate of central line associated blood stream infections (CLABSI) in this organization. The unit practices with older guidelines and caregivers have not always exhibited proper hand hygiene, dressing site, Chlorhexidine Gluconate Bath (CHG), caps and hubs, which differs from best practice recommendations and guidelines.

According to the CDC (2017) in 250 hospitals and sub-acute facilities the mean CLABSI rate was 2.1 per 1000 central line (CL) days and only 49% reported having a written central line bundle policy. Of those that monitored compliance, only 38% reported very high compliance with the CL bundle. Changes are needed in this area and only when an organization has a policy with monitored compliance of ≥95% compliance did CLABSI rates decrease.

Review of the Literature

A comprehensive review of the literature was completed using the search method outlined by Garrard (2011) to identify factors associated with the rate of CLABSI, hand hygiene (HH) compliance among health care providers (HCPs), bundle for CLABSI prevention, site maintenance, and current EBP guidelines. Several databases such as CINAHL, Medline, Ovid, Cochrane library, ProQuest Nursing & Alliance Health and ScienceDirect were accessed.

The following keywords were used to gather relevant primary sources: *CLABSI, HAIs, HH, guidelines, CAUTI, staff education* and *performance improvement.* This strategy produced 879 pertinent peer-reviewed journals and articles that were published within the past five years. The search on ScienceDirect using the key word CLABSI for instance resulted in 451 articles and included articles found in Medline and CINHAL. However, the search was limited to the availability of full text portable document format (pdf), abstract and summary. All keywords were combined with the Boolean operator "AND." Controlled vocabulary, often referred to as medical subject headings (MeSH), was utilized if available in the database.

Cumulative Index for Nursing and Allied Health Literature (CINAHL), search engine resulted in 97 articles related to the above mentioned criteria. A total of 178 abstracts were scanned for applicability and retained for inclusion in the literature review. Among the 97 articles, 15 were selected for this literature review if: (a) the sample included CLABSI in

subacute setting; (b) the study examined the associations of HH compliance in relation to CLABSI; (c) CL bundle compliance was measured by direct observation or decrease rate, and (d) the study was published between the years 2014 to 2019. The full text was read and then outlined using the Matrix Method (see Appendix A) as described by Garrard (2011), to assist with critical appraisal process of each piece of evidence.

The full text was read and then outlined using the Matrix Method as described by Garrard (2011), to assist with critical appraisal process of each piece of evidence. The CDC website was searched for recent guidelines for the prevention CLABSI. The Society for Healthcare Epidemiology of America (SHEA) and the Agency for Healthcare Research and Quality (AHRQ) websites were reviewed for relevant material related to CLABSI incidence and surveillance. The articles acquired were outlined for critical appraisal in the matrix, the process of formulating evidence-based clinical interventions will move forward.

Another brief search was conducted through the Yale Links database search engine in the library section utilizing exclusion and inclusion criteria as listed above. The search was limited to studies dating from 2055 to present using combinations of the keywords: central venous catheters (CVC), hospital acquired infection, quality improvement; infection prevention; long–term acute care. Pediatric literature was largely excluded due to the wealth of this literature focusing on the neonatal intensive care setting with little applicability to the adult population. Titles and abstracts of 68 articles were reviewed with 18 included in this review of the literature based on the relevance and significance to this project. The ultimate goal was to mostly gather primary sources to analyze the most reliable and recent data on CLABSI. The search was narrowed by relevance to practice, within five years, and peer-reviewed. A few robust secondary sources were utilized and were instrumental identifying past and current interventions that need

revision and modification. In conclusion, a total of 15 articles were selected and reviewed selecting current benchmark data, new guidelines and applications.

The Joint Commission National Patient Safety *Goal* (2015) states each year hundreds of millions of patients and healthcare workers are affected by HAIs worldwide, causing a significant increase in mortality rates and financial losses for health systems organizations. The Joint Commission recommends continuing education for staff upon hire and then annually to prevent infections. CLABSI is but one of the HAIs listed for prevention. In order to avoid penalties, hospitals and organizations must control infections and halt the contamination rate. The core recommendation to prevent and control infections is to standardize education on infection prevention topics to include vascular access care, hand hygiene, catheter risks, signs of infection and access management (See, Shugart, Lamb, Kallen, Patel & Sinkowitz-Cochran, 2014). Staying up to date on best vascular access practices is important in infection prevention.

According to Lopez (2011), transparency is essential to motivate health care providers and patient care associates. The nurses' assistants or patient care associates (PCAs) educational tool was geared towards their daily activities of bathing, turning, and repositioning patients with a central line. Studies show that bathing patients with chlorhexedine gluconate reduces risk of central line infections. Since the PCAs are the "nurses' eyes", they can be educated to identify signs of infection or problems at the site – such as end of lines without caps; dressings that are visibly dirty, bloody or peeling off; and lines that are not labeled or dated – and report them to the nurses.

Synthesis of the Literature

Findings from the selected articles revealed the following effective strategies: education

of staff geared towards CLABSI prevention and CL maintenance, the use of chlorhexidine gluconate (CHG), and decreasing femoral vein use in some situations as strategic interventions for preventing CLABSI.

Evidence Based Practice: Bundle for CLABSI Prevention

The prevalence of CLABSI is significant and rises each year. It is reported that over 250,000 cases of healthcare acquired blood stream infection occur annually in the United States (Hota et al., 2016). Central line infection is one of the most serious and deadly infections. In a systematic review of 200 prospective studies, the rate of CLABSI per 1,000 catheter-days conducted by Band and Gaynes (2016) the authors found:

Midlines – 0.2 (95% CI 0.0-0.5)

Peripheral catheters – 0.5 (95% CI 0.2-0.7)

PICCs lines – 1.1 (95% CI 0.9-1.3)

Arterial catheters for hemodynamic monitoring – 1.7 (95% CI 1.5-1.7)

In the microsystem study, the Center reported 26 CLABSI in the fiscal year of 2016 and the medicine units contributed for 27% (Band & Gaynes, 2016). There are several factors that contribute to the incidence of CLABSI, but human errors are the most common cause of contamination, aggravated by time and lack of staff and resources. Education is crucial to increase knowledge and skills. According to Rinke et al (2015) there are three major determinants of the risk of infection in an intravascular catheter: type of catheter, location of placement, and duration of the line. There are several studies on acute care and ICU regarding

CLABSI, but few studies were found for the long-term acute care setting (Grigonis, Dawson, Burkett, Dylag, Sears, Helber & Snyder, 2016).

Many factors contributing to CLABSI occurrence include: lack of supply or adequate equipment, which can lead staff to use inappropriate supply; lack of time or inadequate staffing; inexperience or unskilled nurses; inconsistency of the dressings changes not following the aseptic technique protocol, especially not following the scrub rub time technique of two minutes; poor communication among nurses and medical team in the continuous need of the line and delays in the removal of the lines (Noaman, Ragab, Al-Abdullah, Jamjoom, Nadeem, & Ali, 2018). There are several preventive measures to decrease the incidence of CLABSI. These include: the site choice, using the appropriate type of catheter, use of maximal barrier precaution, ensuring proper site care, and removing it as soon it is no longer necessary (Band, & Gaynes, 2016).

The AHRQ (2014) developed *Tools for Reducing Central Line-Associated Blood Stream Infections*, based on four steps called the four Es: Engage, Educate, Execute, and Evaluate. The intervention tools to eliminate CLABSI include 100 percent compliance in hand hygiene, use of chlorhexidine skin preparation, use of full-barrier precaution during catheter insertion, avoidance of the femoral site, and strict maintenance of a sterile field for inserting the line and changing the dressings (Stone et al., 2014).

According to Dawson and Mackrill (2014), good hand hygiene is the cornerstone of infection prevention. Wearing sterile gloves does not eliminate the need for hand hygiene. Proper and effective handwashing before manipulating a central venous catheter helps prevent contamination of central line sites. Hands should be washed with antimicrobial or non-antimicrobial soap and water with adequate rinsing, or cleaned with a waterless, alcohol-based

hand sanitizer before donning sterile gloves. The World Health Organization's key moments to perform hand hygiene are:

- Before touching a patient
- Before clean/aseptic procedures
- After body fluid exposure/risk of exposure (and after glove removal)
- After touching a patient
- After touching patient surroundings

According to Edwards, Purpura and Kochvar (2014), central venous catheters are a vital link to treatment for patients diagnosed with acute illnesses. These devices are used to provide life-saving treatment as well as side effect management. Central venous catheters can also provide a safe and efficient method for blood sampling for individuals who would otherwise be exposed to frequent and often times painful peripheral venipuncture procedures. These catheters, as defined by the Centers for Disease Control (CDC), are catheters whose tip terminates in a great vessel (Mehta et al., 2014). These catheters are used in the treatment of the medically complex patient in the intensive care unit (ICU), the non-ICU setting as well long-term and subacute organizations. Although central venous catheters provide a critical link to treatment, they are also associated with a risk of infection (Jacob, 2014).

The CDC (2017) guidelines for the prevention of intravascular catheter-related infection also included education for the staff regarding proper procedures for the insertion and maintenance of the central lines, periodic assessment of knowledge and skill of staff that inserts and maintain the lines, and designation of staff trained only for the insertion of the central lines.

According to Dawson and Mackrill (2014) approximately 20% of all HAIs can be prevented. Effective hand hygiene plays a significant role in controlling the rate of infection. The authors believed that nurses can play a major role in providing patients the necessary knowledge in preventing infections modeling good accurate handwashing practices. Another study revealed that providers clearly understood the significance of proper HH, but were only successful with this task 30% of the time (Flodgren, Conterno, Mayhew, Omar, Pereira & Shepperd, 2015). The authors strongly believed that HCPs were well aware of the significance of proper HH in the prevention of HAIs despite practicing improper HH techniques. Evidence also suggests that HCP's were able to identify quickly the five moments in which proper HH should be implemented (Jacobs, 2014).

The objective of evidence-based practice is to assist HCPs in delivering the highest quality of healthcare and ensuring the best patient outcomes (Melnyk & Fineout-Overholt, 2011). When critiquing evidence, there are various grading structures available to measure the validity and dependability of the evidence (Polit & Beck, 2012). The literature also suggests that HCPs were well aware of the significance of proper HH in the prevention of HAIs despite practicing improper HH techniques (CDC, 2017).

Evidence also suggests that HCP's were able to identify quickly the five moments in which proper HH should be implemented (Jacobs, 2014). Several researchers suggest there is a lesser risk of infection in midlines compared to central lines (Ottum, Sethi, Jacobs, Zerbel, Gaines, & Safdar, 2013). The use of a catheter maintenance bundle can significantly reduce the incidence of CLABSI (Grigonis et al., 2016). Another promising strategy to reduce CLABSI is daily chlorhexedine baths, and when combines with proper HH, the incidence of CLABSI significantly reduced. There is a large amount of scientific literature supporting staff education as

a means to decreasing infection rates in hospitals and other healthcare settings (Gaynes & Band, 2016).

The scientific literature related to improving care offers evidence in support of specific ideas or will make possible a formal comparative exploration of a best practice and knowledge can be combined and shared (Nelson et. al., 2007). Chang, Yu, Loh and Chang (2016) conducted a study on the effectiveness of an in-service education and found that education enhances knowledge and increases compliance of central lines.

A study conducted by Edwards et al (2014) analyzed patients' knowledge of HAIs; however, the data from the research showed that 76% of patients have heard of MRSA, but only 44% heard of Clostridium difficile. Furthermore, most patients did not know that taking antibiotics, having a chronic disease, having surgery, or being aged >65 was associated with increased risk of infection. These patients also did not know how to identify the signs and symptoms that would indicate an infection; and did not know how to prevent the spread of infection to others. The CDC (2017) states that most health care associated infections (HAIs) are directly related to infectivity from the hand of the health care provider, the hand of the patient, contact with the clinical practice environment, and contamination from the skin of the patient.

Findings from literature reviewed revealed many different strategies to implement and ensure an effective campaign to reduce CLABSI. One critical process to this campaign will be the challenge of disseminate pertinent and EBP data. Traditionally data is collected through direct observation, and this process is considered to be the gold standard (Garrett, 2015). The primary goal is to aid in the reduction of central line infections.

The CDC (2017) has proposed and implemented new strategies to combat CLABSI and aims to decrease the rate of infection. The assumption is all nursing staff understands aseptic

techniques and the important role it plays in the prevention of site contamination. Nevertheless, the increased rate of infection remains alarming and warrants for more measures to control it.

The common thread among the articles is the focus on staff education, current EBP guidelines, affective HH, prevention bundle, CHG daily bath, the use of Sorbiview site dressing displays that the best clinical practices bring the best results (CDC, 2017). The vast amount of scientific literature available also shows evidence to support staff education as a means to decrease infection rates in all healthcare settings. The pressure to reduce CLABSI has led to more research and studies, which led to the creation of new guidelines. Changes in current practice increased the need for data collection and more accurate methods of measurements (Hota et al., 2015).

According to the Joint Commission National Patient Safety Goal (2015) each year hundreds of millions of patients and healthcare workers are affected by HAIs, causing a significant increase in mortality rates and financial losses for health systems organizations. The *Joint Commission* recommends continuing education for staff upon hire and then annually to prevent infections. Central line infection is one of the HAIs listed for prevention. In order to avoid penalties, hospitals and organizations must control infections and halt the contamination rate. The pressure to reduce CLABSI has led to more research and studies, which led to the creation of new guidelines. Changes in current practice increase the need for data collection and more accurate methods of measurements (Hota et al., 2015).

Theoretical Framework or Evidence Based Practice Model

Finkelman and Kenner (2012) discuss the care provided to clients oftentimes does not reflect current knowledge due to the complexity of disseminating and analyzing data even when the data is readily available. The authors proposed the *Ace Star Model of the Cycle of Knowledge*

Transformation which provides a framework to organize the evidence-based practice processes and approaches. It encompasses a sequence of stages through several cycles of knowledge: knowledge discovery, evidence summary, translation into practice recommendations, integration into practice, and evaluation (Howley & Chuang, 2011).

This framework focuses on the systematic evaluation of medical care the patient receives as well as specific attributes of healthcare services. This model has been used extensively in health services research in order to capture elements that are relevant to patient care quality. The classic components of this model include evaluation of structure, process and outcomes are integral to improving central line-associated bloodstream infection rates in the subacute care setting (Jacob, 2014). (See Appendix I). Undoubtedly, reduction of central line infections is a very serious matter.

Goals, Objectives and Expected Outcomes

Sustained reduction of central line-associated bloodstream infections remains elusive in many institutions, including the long-term acute care facilities despite a focus on improving patient outcomes. The Institute for Healthcare Instrument recommends five key measures based on best-practice guidelines to fight CLABSI.

- Hand hygiene
- Maximal barrier precautions on insertion of the central venous catheter (CVC)
- Chlorhexidine skin antisepsis
- Optimal catheter site selection; subclavian vein is the preferred site in adults for non-tunneled catheters
- Daily review of line necessity, with prompt removal of unnecessary lines

This group of evidence-based interventions is called the "central-line bundle". The staff understanding of CLABSI and evidence-based bundle practice can improve patient outcomes significantly (CDC, 2017). The use of the central-line bundle dramatically reduces the incidence of CLABSI, and the reduction is sustainable.

The overall goal of this project was to reduce the rate of infection creating a culture of safety by use of evidence-based guidelines in the form of the "central line bundle" to prevent CLABSI infections. The main goal of this project was to educate on best practice prevention education including using chlorhexidine gluconate (CHG), and decreasing femoral vein use.

There are several factors influencing the CLABSI rate; they are multifactorial and must be addressed with a detailed action plan. A Fishbone diagram illustrates the causes that contribute to the incidence of CLABSI (See appendix F). Strategies aimed at mitigating gaps and barriers are essential for preventing infections in this medically complex population. The staff understanding of CLABSI and evidence-based bundle practice can improve patient outcomes significantly. Organizational variables include system leadership, expectations related to quality of care and outcomes as well as transparency as part of a culture of safety.

The risk factors associated with the development of central line-associated bloodstream infections in the unit may range from site selection for catheter placement, a lack of sterile technique for maintenance practices, duration of catheter placement, lack of proper equipment/supplies, inexperienced nursing staff, and ineffective communication among providers (See appendix F).

The goal of staff education modules was to inform nurses of the severity and causes of central line-associated bloodstream infections to help reduce the rate of infection. Strategies

associated with prevention of CLABSI and a group of evidence-based interventions were presented to all staff. At the end of the presentation, staff should be able to:

- Describe the severity of CLABSI
- Describe the central-line bundle
- Describe the five components of the central-line bundle
- Explain the causes and risk factors of CLABSIs
- Demonstrate proper and effective hand hygiene

The teach-back method was implemented to ensure employees' understanding and retention of new information. Documentation of such education was imperative, as this information is essential for auditing purposes. Staff participated in mandatory education online and at unit meetings regarding process and follow up statistics. All staff, including physicians were educated regarding CDC (2017) recommendations for prevention of HAIs specifically with Chlorhexidine Gluconate bath. Patient refusals for CHG bathing must be taken very seriously and followed up on appropriately.

Methods

The quality improvement project was implemented at a sub-acute facility in Middletown, Connecticut. The center is one of the largest rehabilitation facilities and is fully staffed to accommodate clients that are unable to go home after a short stay at their local hospital. The project was a combination of staff development education and implementing current guidelines to reduce the rate of CLABSIs and include the collection of both quantitative and qualitative data.

The facility is classified as a subacute and rehabilitation center. The staff is comprised of registered nurses, licensed practical nurse, patient care assistants as well as a full-time infection control nurse and case manager. It includes a medical director who is a physician on call. In addition, there are two full-time Nurse Practitioners (NPs) and they work during the week also provide weekend coverage. This institution is funded by the State of Connecticut, private donations and fund raising. The Information Technology (IT) department monitors all measurements regarding performance, cost and quality.

An educational in-service tool with a focus on decreasing the rate of CLABSI was provided to the nursing staff on general knowledge on infections and guidance in the unit's efforts to decrease infection rates via PowerPoint. The educational tool was different for nurses and PCAs as they have different job descriptions. The nurses' assistants (PCAs) were provided with guidelines in the care of patients with a central line. The nurses' assistants or patient care associates (PCAs) educational tool were geared towards their daily activities of bathing, turning, and repositioning patients with a central line.

Studies show that bathing patients with chlorhexedine gluconate reduces risk of central line infections (Felix, 2014). Since the PCAs are the 'nurses' eyes', they were instructed how to identify signs of infection or problems at the site – such as end of lines without caps; dressings that are visibly dirty, bloody or peeling off; and lines that are not labeled or dated and to immediately report them to the nurses. Such prompt information helps nurses intervene quickly and keep the lines clean, capped and patent. Sustained reduction of central line-associated bloodstream infections remains elusive in many institutions, including the long-term acute care facilities despite a focus on improving patient outcomes.

To measure the outcomes of this quality improvement project, pre and post-tests were administered to all staff (See Appendices J & K). Central line care and maintenance practice survey announcements were sent to all participants via email (See appendix M). The purpose of the clinical practice survey was designed to analyze structure and process variables associated with CLABSI prevention. It was important to gauge staff understanding of policies, procedures and barriers to adherence to the guidelines. The clinical survey subsequently served as an educational intervention based on findings and conclusions of the gap analysis. This tool was used as a platform for engaging staff in sustainable performance improvement processes.

It was necessary to look at evidence to support recommended equipment in infection prevention such as CHG bathing or re-evaluation of dressing techniques. Such prompt information will help nurses intervene quickly and keep the lines clean, capped and patent. The DNP-student nurse was well prepared to lead this clinical practice improvement in the subacute care setting successfully.

Data Collection Procedures

In all of the studies reviewed, pre-intervention data involved practice as 'usual that is', caring for central lines in a manner that the organization had deemed acceptable for the time leading up to the intervention. Based on the evidence reviewed, there was an agreement that any strategy to prevent CLABSI is better than no strategy at all. The goal was to implement these strategies to improve safety and quality for this vulnerable population.

Data on patients who came in with central lines was gathered over a 12-week period during which infections status changes and nursing documentation regarding patient care were monitored. A total of six in person in-services were given and two virtually to the whole group.

It was imperative for staff to understand policies, procedures and barriers to adherence to the guidelines and their roles in the prevention of central line-associated bloodstream infections. Surveys and flyers were kept at the nursing stations with information on policy and procedure for central line maintenance (See Appendix L).

The survey was developed in conjunction with unit-based leadership using a multifaceted approach. The theory behind obtaining information from the clinical practice survey was that the subsequent educational intervention could then be based on findings/conclusion to the gap analysis. This was a platform for engaging staff in sustainable performance improvement processes. The pre and post-tests were developed by the DNP student and the nurse educator in collaboration with the infection control nurse (See Appendix J & Appendix K).

The data was measured using descriptive statistics comparing the percentage of correct responses on the pre and post-tests to measure the effectiveness of the educational intervention (Appendix D). Open ended responses were analyzed for common themes. Descriptive statistics such as graph and charts were used to present results and expected outcomes based on the chart review and observations of clinical practice.

Ethical Considerations/Protection of Human Subjects

The University of Massachusetts, Amherst (Umass) Internal Review Board (IRB) approval was obtained prior to initiating the DNP project. A letter of support has been obtained from the project site (See Appendix H).The Health Insurance Portability and Accountability Act (HIPAA) privacy rule and standards protected personal health information. Disclosure is allowed for treatment, payment, as well as operations such as quality, utilization review and credentialing (Haque, Sartelli, McKimm, & Abu Bakar, 2018).

All staff was invited to participate in a voluntary and anonymous survey about current practice related to the care of and the use of central lines. This survey was part of a quality improvement project to assess current practice in subacute and long-term care settings related to central lines care and maintenance. This QI project focused on CLABSI practice change initiatives through the implementation of EBP guidelines and staff education.

Results

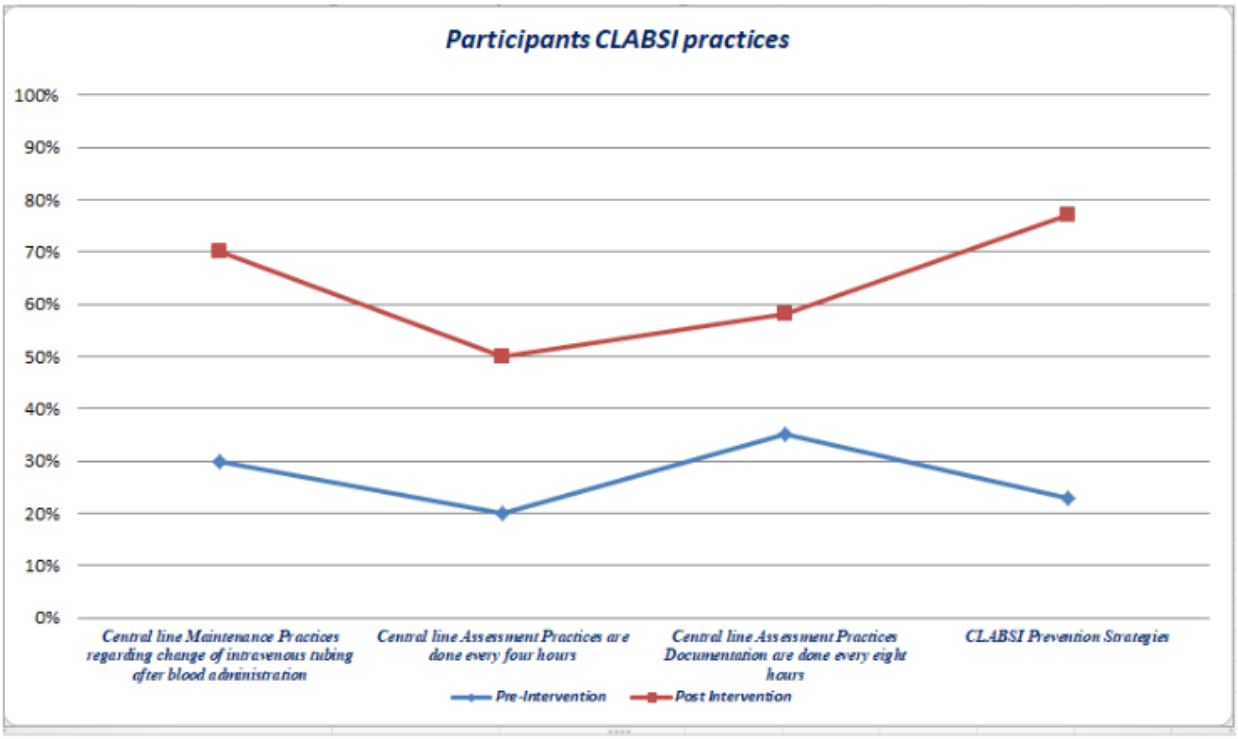
A team of three staff nurses helped the DNP student collect data on the bathing of the patients and documentations of care of central lines. The six in person education sessions and two virtual sessions for nurses on infection control were attended by a total of 22 nurses included were 13 RNs [59.1%] and 9 LPNs [40.9%]. During each session a pre and post-test was given.

A total of 22 surveys were returned from an eligible pool of 29 registered and licensed practical nurses. The survey was available for a total of three weeks with 8 respondents completing the survey in the first week, 10 in the second and 4 in the third. This represents a survey return rate of 75.9. %. Of the surveys returned, 21 were completed in their entirety with one survey missing a response to one or more questions. The Survey with the missing responses was discussed and the answers for this one incomplete survey were included.

Findings from the clinical practice survey pointed to gaps in practice as compared to policy and inconsistent understanding of evidence-based practice strategies associated with CLABSI prevention. The survey results helped develop subsequent plan for educational interventions regarding appropriate central line practices and CLABSI prevention strategies. (See Appendix J; See Appendix K). This method coupled with infection control rounding and unit-based champions resulted in a significant reduction of CLABSI's of 78.3 percent from September 2019 to an average rate of 90 percent approximately post-intervention. Results can be

further categorized into three main topics: central line maintenance practices, central line assessment practices, and CLABSI prevention strategies (See Table 1).

Table 1. Pre-Post Survey Results



This qualitative and quantitative data gathering methods were linked to the strategic implementation EBP for evaluation purposes, questions, models and standards. The methods and tools allowed for a comprehensive evaluation of staff's lack of knowledge and effective learning. Staff had easy access to e-manual as well as several hard copies located in each unit. Effective and efficient communication is a great choice for disseminating evidence quickly to those in positions to implement change. The DNP student had several round table discussions to determine the best way modify the teaching/learning process prior to the initial assessment of the microsystem as illustrated in Figure 1.

Implementation Strategies for Evidence-Based Practice

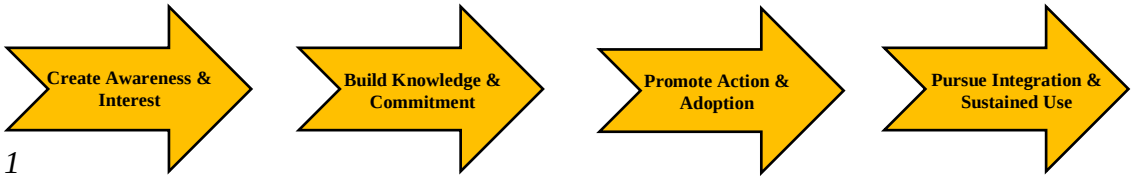


Figure 1

Central Line Maintenance Practices

The questions that referred to central line maintenance practices, a majority of the respondents provided correct answers to the survey questions related to end cap access and tubing/end cap changes. Staff clearly identified the appropriate agent for accessing a central line through an end cap as well as changing the end caps at the appropriate time interval. There were two individuals that responded that she did not always either prep the end cap when administering a medication or flush the central venous catheter before and after medication administration.

Nearly 30% of the survey respondents shared end cap preparation practices intravenous tubing were not always changed after administering blood or blood products. Staff could articulate the appropriate timeframe for tubing changes but shared the practice of documenting the change approximately 50% of the time. Questions related to central line dressing changes were answered by all respondents, revealing a great deal of detail related to practice as well as some opportunities for improvement.

Staff was able to clearly acknowledge the need to change a central line dressing when it was soiled or defective. All of the respondents use the central line dressing kit that is available on the unit with the appropriate cleansing agent and sterile field to promote sterile technique. Nearly 26 % of the respondents acknowledged hand hygiene practices that were not aimed at infection prevention at the point of dressing change. This included hand hygiene at the point of

room entry and prior to removal of the old central line dressing. Also, improper hand hygiene prior to the application of sterile gloves for a dressing change.

Central Line Assessment Practices

Central line assessment practice question results revealed a staff that was clearly unaware of standards for assessment and documentation. Nearly 50% shared practices of assessment every four hours with documentation of an assessment every eight hours by 58.1%. This was not at all consistent with unit policy that requires documentation of an assessment every eight hours and with every tubing and end cap change.

CLABSI Prevention Strategies

Questions associated with practices aimed at the prevention of central line associated bloodstream did not all line up with the unit-based policy but were considered to be a prudent means of preventing infections. Nearly 23% shared practices of disconnecting the patient from their central line tubing when needing to use the bathroom, change clothes or participate in therapy. Central line tubing was found on the floor sometimes or often by 47.4% of the nursing staff. More than 65% of staff supported incorrect responses related to flushing central lines that were not in use were incorrect while over 50% of the staff shared unclear practices related to capping off intravenous tubing when not in use.

Staff described that they did not consistently obtain orders to restore patency to sluggish central lines. One staff person acknowledged asking a nursing technician to practice outside the scope of his/her practice by disconnecting the patient's central line IV tubing. Staff was unable to provide correct answers to questions related to rationale for and bathing techniques involving the use of the CHG wipes. Over 48% of the respondents appeared to have an incorrect understanding

of the appropriate use of the wipes while 6.5% acknowledged not being sure of how the wipes were supposed to be used.

Open-Ended Questions

The open-ended questions revealed structural barriers to the implementation of evidence-based practice through policy and procedure. There were seven responses to the first open-ended question that focused on practices RNs had personally adopted that he/she believed assisted in the prevention of central line associated bloodstream infections. One staff person felt that cleaning the end of the actual catheter after removing the old end cap, before applying the new one was best practice. Another shared a practice of always wearing gloves when manipulating a central line.

Changing tubing and end caps with total parenteral nutrition and blood transfusions per policy were important to another respondent. One identified education as a personal prevention strategy. Five individuals shared barriers to practices related to the care of the central line. Two identified the lack of a sterile "dead end" cap on the unit for capping off intravenous lines when not in use while three cited inconsistent practices associated with this task as well as the use of the stabilization device. Six respondents shared practices that were consistently ignored related to appropriate central line maintenance; all involved following the policy related to end caps and central line dressing changes. It was felt that end caps were not changed and documented consistently and patients were not always asked to wear a mask for central line dressing changes.

Respondents felt that both dressing and end cap changes were tasks that were handed off in shift to shift report versus being done. Six individuals shared responses to the final open-ended survey question that was intended to solicit ideas for practice improvement. Two involved access to appropriate supplies while four asked for education and practice validation. In

summary, the clinical practice survey revealed opportunities for information/education and clarification related to both central line practices and CLABSI prevention.

The objectives were met as scheduled. The in-service presentations were conducted during staff meetings and e-modules. Copies of the central line bundle tool were accessible to all staff. A clinical practice survey were distributed electronically in the form of a pre-test to assess staff's knowledge related to policy and procedure, fidelity to practice as well as site-specific barriers to adherence to clinical practice guidelines. Post- tests according consisted of multiple choices and open-ended questions. Clinical practice guidelines and basic central line associated bloodstream infection strategies as well as perceived barriers to adherence to policy/procedure were developed. Chart reviews revealed documentation of prevention measures such as Chlorhexidine Gluconate bathing and decreased use of femoral lines and infection rates. Proper and effective hand hygiene had a significant impact in compliance (see figure 1 below).

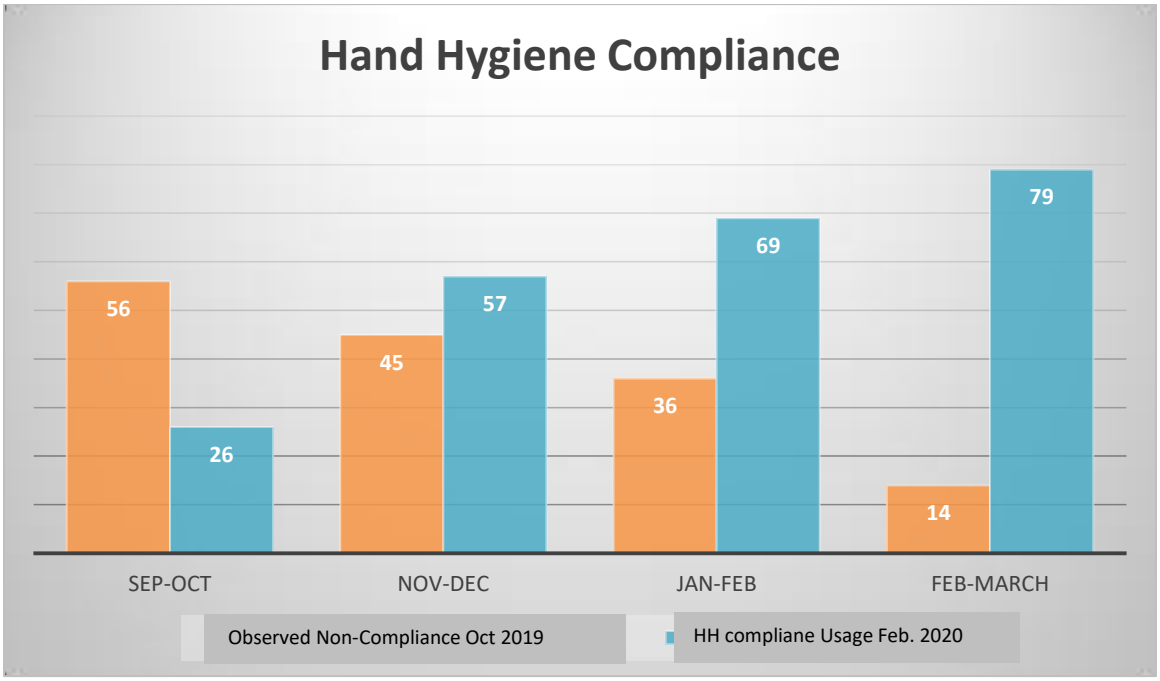


Figure: 1 Increased HH Compliance

Discussion

This project involved the development, distribution and analysis of a clinical practice survey for staff that focused on policy and procedure for central line maintenance as compared to evidence based practice guidelines (process) and the appropriate supplies available (structure) for CLABSI prevention (outcome). The survey proved to be a valuable part of the assessment of the environment of care that has the potential to lead to future work in order to improve the quality and safety of care for a vulnerable population. The *Ace Star Model of the Cycle of Knowledge Transformation* provided a framework for the successful implementation and adherence to the EBP guidelines.

It was important to gauge staff understanding of policies, procedures and barriers to adherence to the guidelines. These guidelines have been endorsed by a variety of professional organizations aimed at the prevention of this largely preventable healthcare-acquired condition. The thought was that this may range from physical barriers such as the availability of appropriate supplies to knowledge barriers such as staff roles in the prevention of central line-associated bloodstream infections.

Facilitators-The project implementation provided an opportunity to increase the awareness of infection prevention. With the inclusion of the nurses' assistants, this project enhanced the staff participation and had a positive impact on the unit by including everyone in the intervention (See Appendix E). The staff was inclusive in gender, race and ethnicity. Other areas of the system's strengths included leadership, organizational support; focus on high performance, and investments in staff education and training. Continuing education was mandatory and available for all employees through Health Stream and E-learning portals. The employees were eager to learn and to share. The floor champions used a variety of strategies to

engage the entire interdisciplinary staff in recognizing their role and opportunity to prevent this devastating health care-associated infection.

Barriers- Cost was a barrier due to new equipment and supplies. The business and the purchasing departments proposed budget before the first staff meeting took place on last September. There were no other road blocks to the implementation of this educational tool because the staff was already involved in the unit's many committees and initiatives. However, managers and administrators faced both real and perceived barriers to implementing evidence-based change at the bedside. Other barriers included the perception of nurses that they did not have the authority to implement such change, did not have a sufficient background in and understanding of research, and lacked the time to read and discussed the latest research with other nurses while working.

Therefore, an educational in-service tool with a focus on decreasing the rate of CLABSI not only reinforced general knowledge and skills, but also provided the staff with clues, help, and guidance in the unit's efforts to decrease infection rates. The need for greater administrative support and mentors from nursing leadership was also cited as a barrier to implementing research by nurses who reported that there is "no support by management, research time is not allotted by administration and no reimbursement or funds to do research (Howley & Chuang, 2011).
The cost of this Quality Improvement Project was funded by the facility. The cost of materials, preparation for in-services, potential staff overtime is projected at a minimum amount of $3500. The DNP QI project is estimated for a maximum cost of $5,000 (See Appendix N).

Conclusion

Central line infection is a preventable condition and exposes the patient to potentially deadly harm, and increases length of stay and inadvertently increases the cost of health care.

CLABSI prevention is a Joint Commission National Patient Safety Goal which includes short- and long-term central venous catheters and peripherally inserted central catheter (PICC) lines. Changes in current practice increase the need for data collection and more accurate methods of measurements (Hota et al., 2015). CLABSI is avoidable and must be a priority issue. It affects most people with other chronic conditions such as hemodialysis patients. These vulnerable populations have an increase in mortality rate (See et al., 2014).

The reduction of infection rates directly impacts the quality of care by improving patients' outcome. Since acquired infection is not reimbursed, reducing it reduces hospital costs. In the effective reduction of infection, the impact of only one measure would not be enough. It is the combined effect of a multimodality intervention approach that actually reduces the infection rate. Thus, collaboration is essential for the implementation of any project. Outcome is enhanced when there are many inputs from different sources working together. Collaboration is essential for the optimal function of a microsystem.

For this project, primary sources were used ensuring the most reliable and recent information on the subject since there are always new practice guidelines on CLABSI prevention. After delving into the review of literature, we found the unit current guidelines regarding the IV catheter and central line tubing were outdated. The articles from the literature review unanimously focused on the chosen site of the central line, appropriate the type and size of the catheter, ensuring proper site care, and removing the access line as soon it is no longer necessary. We reviewed and discussed some compelling research studies that were published within the last few years; suggesting replacing the access lines only when clinically indicated. However, the infection control nurse matrix demonstrated an increased in blood stream infections, a decreased in patient satisfaction and increased facility costs.

Therefore it was concluded, the most cost effective approach was to change the tubing every day when in use or 72 hours after the last infusion. The DNP student believed adding more tasks would not solved our dilemma of reducing the rate of central line infection in the facility. Moreover, adding more checklists would have been burdensome to the staff. In fact, similar past practices did not improve adherence to the policy and guidelines. A myriad of other infection related factors was already challenging and quite difficult. The DNP student needed to create solutions that required a minimum of effort along with rigorous educational curriculum via e-modules. We had to develop an easier way for any staff to walk into a patient's room, will know instantly when tubing needs to be changed. The motto was *'think simple, fast, and easy.'* We needed to work on a simple solution for a complex issue.

Central venous catheter infections can be fatal and this accentuates the importance of assessing HCP's knowledge, practice, and compliance. Part of this project included a communication campaign, education with online learning opportunities, environmental optimization, leadership engagement, performance improvement measures and feedback. Establishing adherence to an effective staff education program that can help controlling the development of HAIs (Bolesta & Chmil, 2014). Prevention is geared towards educating staff in aseptic techniques when performing dressing changes and empowering the staff to advocate for the prompt removal of central lines as soon it is no longer indicated.

Among the many factors contributing to CLABSI occurrence are: lack of supply or adequate equipment, which can lead staff to use inappropriate supply; lack of time or inadequate staffing; inexperience or unskilled nurses; inconsistency of the dressings changes not following the aseptic technique protocol, especially not following the scrub rub time technique of two minutes; poor communication among nurses and medical team in the continuous need of the line

and delays in the removal of the lines. The conceptual framework utilized the Project Planning Based Model for improvement (see appendix H). This cycle diagram utilized four steps that are used repetitively. These steps assessed changes in small increment, minimized potential risks and improve staff compliance (Nelson, Batalden & Godfrey, 2007).

The *plan* phase began with the start of the capstone project, projected staff education, teaching methods (pre and post survey) data collection and expected results. The *do* phase focused on documentation of expected and unexpected events (COVID-19 Pandemic), as well as test results and measureable goals and outcomes. The *study* phase aimed at the quality improvement project and the analysis of the data collected. Lastly, the *act* phase was the determination factor that concluded that the project has achieved its goals and objectives. This step also addressed any last minutes changes/modifications in the project timeline. The Project Planning Based Model gave the DNP student and her collaborative team, the steps and directions to implement this QI successfully. The aim was to reduce the rate of CLABSI with educational intervention tools to generate new learning and to increase awareness among the staff regarding health associated infections in this facility.

The adherence to guidelines for prevention of CLABSI is crucial in the battle to infection control (Mehta et al., 2014). Education, training, and the search for best practices have led to several studies and controlled trials. Implementation of a structured, bundled approach of evidence based-strategies is the best way to prevent CLABSIs. The health care system and its workers are responsible for providing safe care to patients by preventing the spread of infection.

Nurses play a pivotal role in patient safety and health care efficacy with a need to focus on elements of successful achievement of key outcomes. The performance measurement of nursing care has become increasingly important. The staff adherence to effective and proper

hand hygiene had a significant role in controlling central line infections. Hand Hygiene compliance in the sub-acute unit increased through the implementation of a strong educational and awareness campaign, proper location of hand hygiene stations, leadership involvement and employee's feedback. Nurses also play a major role in providing patients the necessary knowledge in preventing infections as well as role modeling good hand hygiene practices.

The DNP role is essential for the improvement of the health care system. This role encompasses many different areas within the nursing profession and the healthcare arena. During this clinical immersion project, the DNP candidate utilized the necessary skills to track/monitor quality data and motivate change through staff education and current EBP guidelines.

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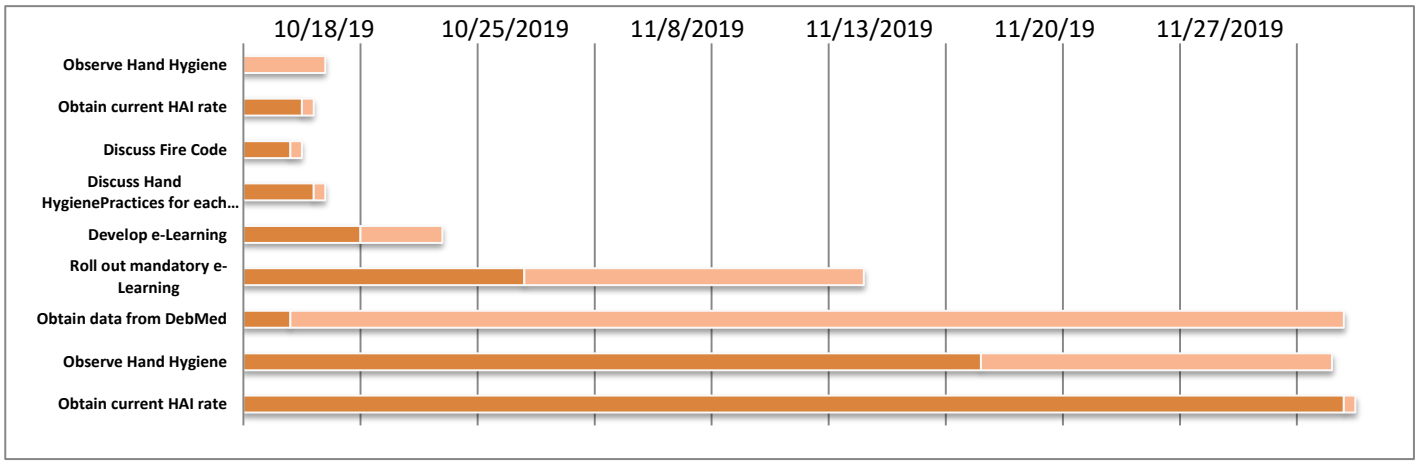
Appendix A

Gap-Analysis

Column 1	Column 2	Column 3	Column 4
Best Practice Solution/s	**Best Practice Strategies (Bullet list)**	**How the Community/Clinical Site Differs From Best Practice (Bullet List)**	**Potential Barriers and Facilitators that can overcome the Barriers to Best Practice Implementation (Bullet list and separate)**
Centers for Disease Control and Prevention. (2011, revised 2017). "Guidelines for the prevention of intravascular catheter-related infections" [Online]. Accessed March 2019	**Hand hygiene can significantly reduce the risk of cross-transmission of infection in healthcare facilities**	Although evidence based practice guidelines are increasingly being implemented in this facility still lack the basics of infection control	Potential barriers: automatic hand sanitizers, Staff education, Staff resistance, Non-compliance
	Transparent Sorbiview dressing. Gardia CHG patch at the site.	**Occlusive dressing-** Telfa and gauze are utilized	Establish- floor champions to monitor-Cap change with tubing change every 96 hours
	Gardia CHG patch at the site. Dressings are changed using masks sterile gloves weekly	**Tegaderm** are used at the site. Dressings are change without masks and sterile gloves. >wk.	CHG bath **daily** for patients with central lines- gap in patient-staff ratio.
Kneflin, N., O'Quinn, L., Geigle, G., Mott, B., Nebrig, D., Munafo, J. (2016). Direct care nurses on the shared governance journey towards positive patient outcomes. 25(5-6): 875-82	**Inquiry council members to conduct systematic evidence search on best practices about chlorhexidine bathing.**	Lack of staff involvement Lack of leadership	Lack of staff involvement Lack of leadership
	Daily bathing with chlorhexidine positively impact patient outcomes	No change proposal	Lack of awareness of infection prevention.
	Shared governance structure and direct care nurse leaders can improve Pt. care	No reinforcement no exchange of ideas	The Exclusion of the nurses' assistants & other ancillary staff participation

Appendix B

Gantt Chart- Tasks to be performed over a timeframe of 6 weeks



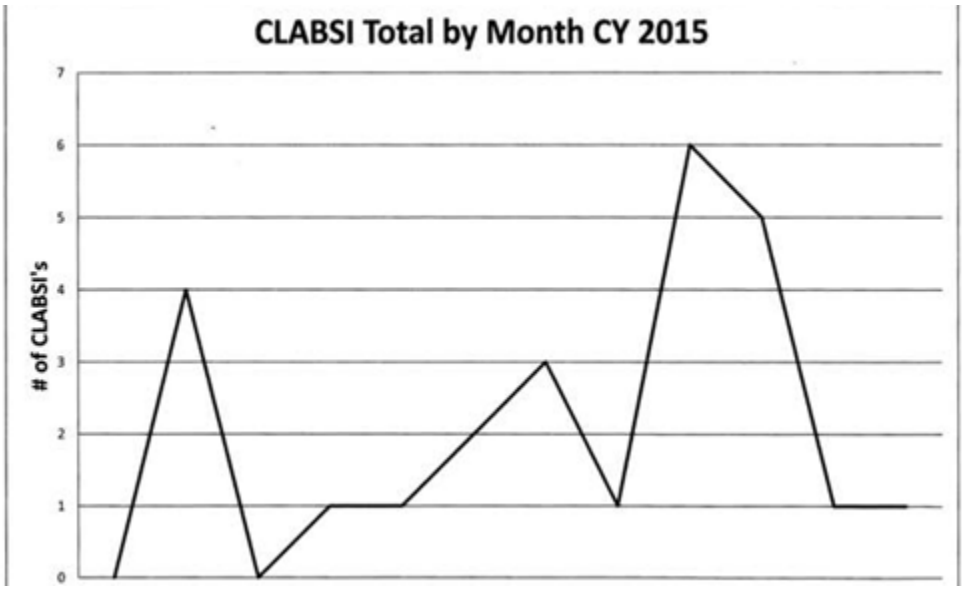
Appendix C

Action Plan (subject to change)

Task	Date to Complete	Percent Complete	Percent Incomplete
Observe Hand Hygiene	10/18 – 11/27/19		
Obtain Current HAIs Rate	10/18/2019		
Discuss Fire Code	10/20/2019		
Discuss Hand Hygiene Practices for Each Infectious Agent	10/21/2019		
Develop E-Learning	10/27/2019		
Roll Out Mandatory E-Learning Modules	11/8/2019		
Observe Hand Hygiene	11/8 -11/27/19		
Observe Data related to GHD bath	11/15/19		
Obtain Current HAIs Rate	11/27/19		

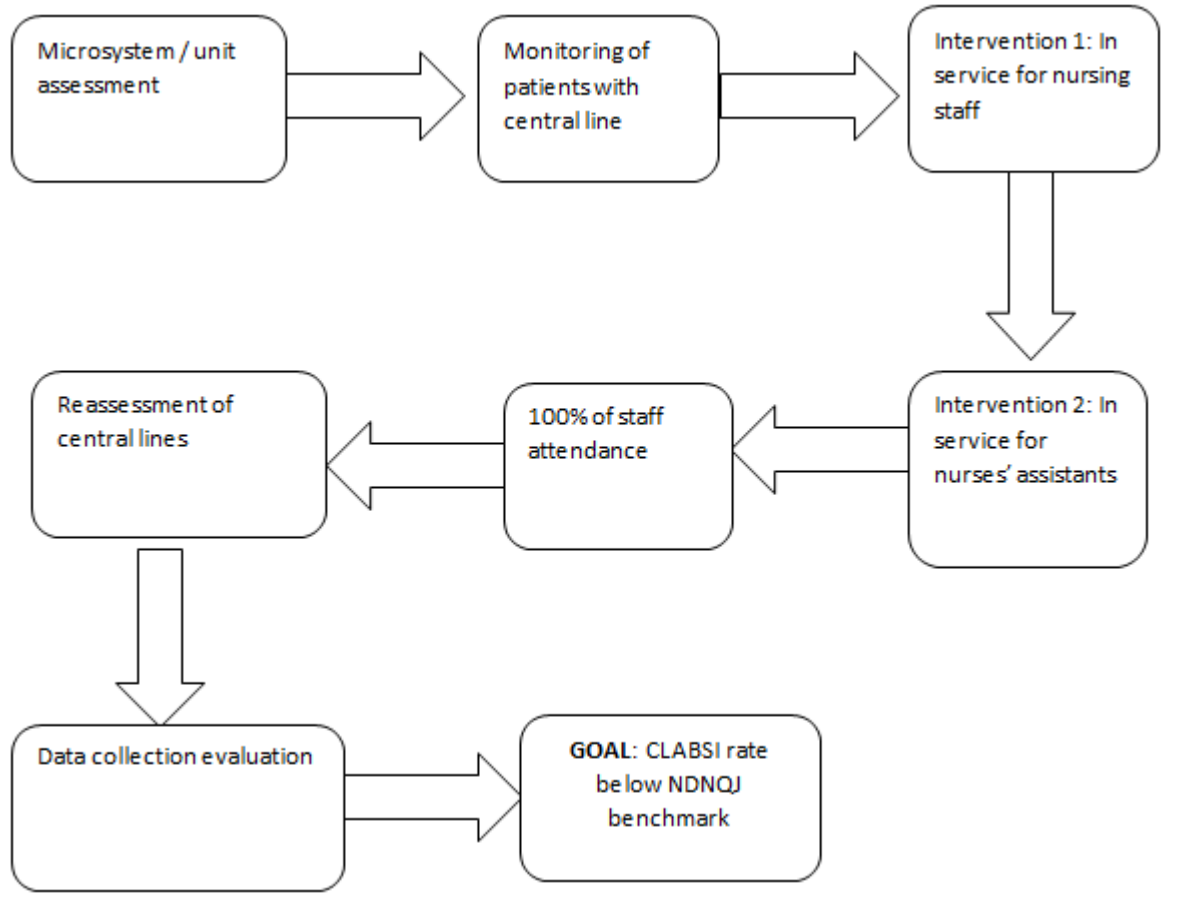
Appendix D

CLABSI Report and Trend from 2015 / 2016



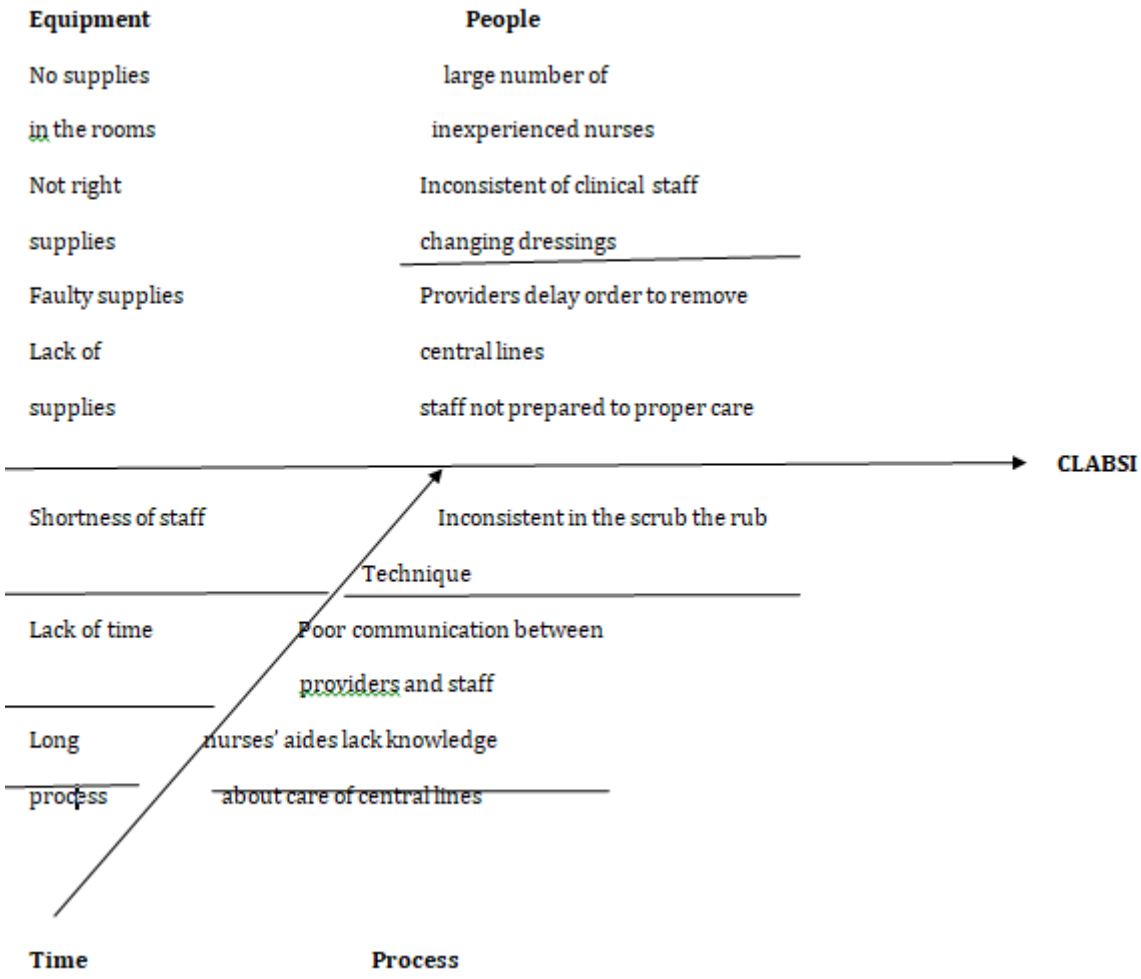
Appendix E

CLABSI Flowchart Goal and Assessment



Appendix F

Fishbone Diagram



Appendix G

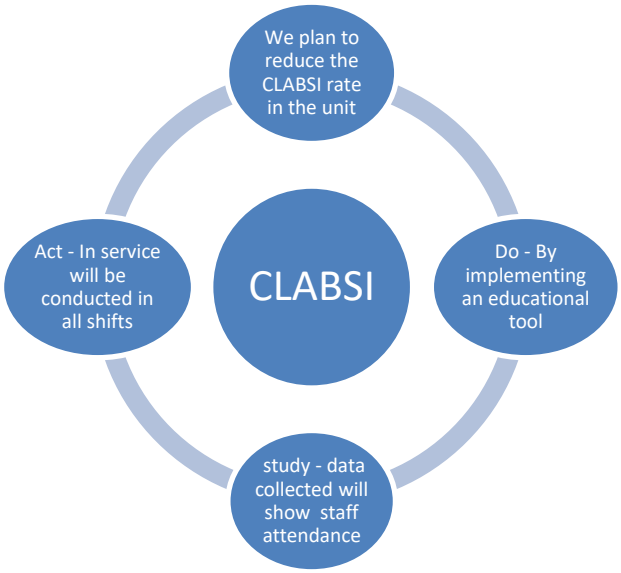
Timeline (Estimated-7 months)

Table 1

Task	October	November	December	January	February	March	April
Eligible Participants	X	continued	continued				
Intervention; Evaluation; Toolkit		X	X				
Post-test Analysis Outcome				X	X	X	X
Results							X

Appendix H

Project Planning Based Model



Appendix I

Pre Test Questions

When not in use, I use the following practices when capping off intravenous tubing so it can be used again (check all that applies):

a. Use the original cap

b. Use the cap from a saline flush

c. Insert the end into the MicroClave on the IV tubing

d. Use a new sterile “dead end cap”

Is there anything else that you regularly do that you believe helps prevent central-line associated bloodstream infections? Please describe.

Are there barriers to your practice related to the care of the central line? If yes, please describe.

What would help you/your colleagues to practice better? Please describe.

When prepping the end cap, what agent do you use? Please describe.

For how many seconds do you prep the end cap? Please describe.

Describe the severity of CLABSIs.

Explain the causes and risk factors of CLABSIs

Appendix J

Post Test Questions

Briefly describe how often do it is recommended to change intravenous tubing on central lines?

Describe the five components of the central-line bundle

How often should you change the end caps on central lines? Why?

How often do you assess a central line site and change central line site dressings

When and why should you document the assessment of a central line site?

What are the risk factors for the development of central line-associated bloodstream infections?

Discuss some evidence-based practices guidelines related to central line maintenance recommendation specific your facility?

After viewing the video discuss the role of the 'Vascular Access Team' (VAT)?

What additional information/insight can staff provide on prevention of central line-associated bloodstream infections?

What would help you/your colleagues to practice better?

Appendix K: 5-5 CLABSI Awareness Flyer

5-5 CLABSI AWARENESS

KEY STEPS TO REDUCE CLABSI

- Actively remove any unnecessary lines ASAP
- Hand hygiene compliance
- Daily review audit sheet
- 2 person dressing change checklist at bedside
- Peripheral IV placed by U/S for difficult access patients
- Scrub the hub
- Use of alcohol caps on all tubing
- Check dates of IV tubing to remove expired tubing

Together we can keep our patients safe and prevent Central line infections

Yale New Haven Hospital

References: CDC (2011) Guidelines for the Prevention of Intravascular Catheter-Related Infections

Appendix L

REDUCING CENTRAL LINE BLOOD STREAM INFECTION

CHECK LIST FOR PCAS

- Chlorhexidine bath for all patients with a central line: bathe all patients with chlorhexidine gluconate from waist up.
- Cover the central lines with a small towel when bathing the patients
- Turn and reposition patient with central line : Be aware that the lines has an small tubing extension that can be tucked in the patient's arm pit, linens or gown, and it can get dislodged when moving the patient.
- Check if all ends of the lines has a blue cover on and let the nurse know if it doesn't.
- Check if the dressings are intact and notify the nurses if it is loose, peeling off or wet.
- Help the nurses when doing the dressings changing by timing the scrub the hub and handling supplies.

Appendix M

2 person CVAD checklist at bedside

Pt Name: MRN: Date:

RN (performing dressing Change): 2nd person:

Gather the following supplies: Appropriate dressing kit for line, 2 face masks (2nd person and patient), pair of sterile gloves for second person

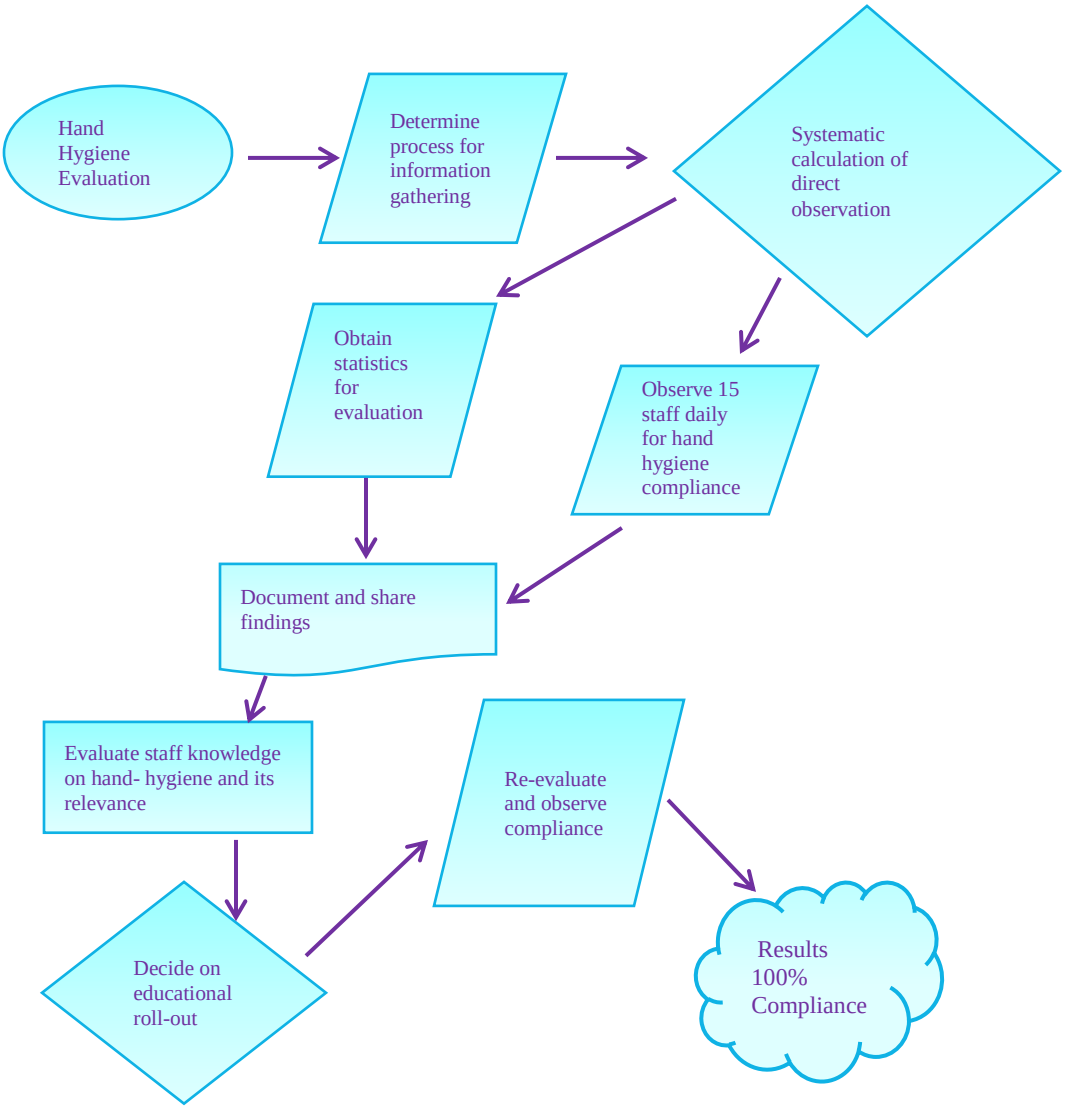
Second person will read out step to person performing dressing change in order to ensure proper technique and keep time when scrubbing site

Step	Procedure	Completed
1	Assembles all equipment on clean surface before procedure	
2	Puts on mask	
3	instructs patient to turn head away from insertion site before removing old dressing or put on mask	
4	Opens dressing kit maintaining sterile field	
5	Puts on clean gloves and removes old dressing and securement device	
6	Removes dirty gloves and uses hand sanitizer for 15 seconds and puts on sterile gloves	
7	Cleanses area around insertion site using alcohol swabs removing debris (in to out motion)	
8	Scrubs the skin with CHG scrub encompassing area 3 inches out from insertion using a vigorous back and forth motion for 2 minutes per product recommendation	
9	Apply the securement device if applicable	
10	Apply the new dressing with CHG impregnated product so that it covers the entire insertion site and sutures if present.	
11	Secure catheter with tape strips provided	
12	Apply label with time date and initials	

Comments:

APPENDIX N

PERFORMANCE IMPROVEMENT HAND HYGIENE PLAN



Appendix O


My 5 Moments for Hand Hygiene
1 BEFORE TOUCHING A PATIENT
2 BEFORE CLEAN/ASEPTIC PROCEDURE
3 AFTER BODY FLUID EXPOSURE RISK
4 AFTER TOUCHING A PATIENT
5 AFTER TOUCHING PATIENT SURROUNDINGS

Appendix P

Central Line Care and Maintenance Practice Survey Announcement

You are invited to participate in a voluntary survey about current practice related to care for and use of central lines.

This survey is part of a quality improvement project that aims to:

• assess current practice related to central line care and maintenance

• evaluate if there are any issues that may be contributing to central line-associated bloodstream infections

Who: Registered Nurses, Vascular Access Team, Floor Champions who work on the subacute unit

What: Take a 15 minute survey

When: You may access the link via email from this time until (To be determined)

How: Access your email and "click" on the survey link.

Fill out the survey and submit.